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THE DENTAL PRACTITIONER

A monthly journal for the Practitioner and his Staff

VOL. II, NO. 2 OCTOBER, 1951

Incorporating the Official Supplement of
The Dental Laboratories Section of the Surgical Instrument Manufacturers' Association

CONTENTS

Editorial : We'll be There

A New Presentation of Some Common Features of the Structure of Human Enamel : J. J. HODSON, L.D.S. R.C.S. Edin., B.D.S. Sheff.

Modern Plaster Production : J. F. STIRLING

A Case of Local Hypoplasia of the Second Upper Premolar due to Trauma
E. J. PERINT, M.D., D.D.S. Hungary, L.D.S. R.C.S. Eng.

Dental Radiography and Darkroom Procedure, No. 4

New Materials and Appliances Letters to the Editor

Abstracts from Other Journals Book Reviews

Official Supplement of the S.I.M.A.—Dental Laboratories Section

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THE DENTAL PRACTITIONER

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(Incorporating the Proceedings of the British Society of Periodontology)

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VOL. II, No. 2 **CONTENTS** OCTOBER, 1951

PAGE

EDITORIAL: WE'LL BE THERE - - - - - - - - - 33

A NEW PRESENTATION OF SOME COMMON FEATURES OF THE STRUCTURE OF HUMAN ENAMEL (continued) - - *J. J. Hodson, L.D.S. R.C.S. Edin., B.D.S. Sheff.* 34

MODERN PLASTER PRODUCTION - - - - - - - *J. F. Stirling* 45

A CASE OF LOCAL HYPOPLASIA OF THE SECOND UPPER PREMOLAR DUE TO TRAUMA *E. J. Perint, M.D., D.D.S. Hungary, L.D.S. R.C.S. Eng.* 51

DENTAL RADIOGRAPHY AND DARKROOM PROCEDURE, No. 4 - - - - - 52

NEW MATERIALS AND APPLIANCES: CROFORM DUPLICATING MATERIAL - - - 53

LETTERS TO THE EDITOR - - - - - - - - - 54

ABSTRACTS FROM OTHER JOURNALS - - - - - - - - 56

BOOK REVIEWS - - - - - - - - - - - 57

OFFICIAL SUPPLEMENT OF THE SURGICAL INSTRUMENT MANUFACTURERS' ASSOCIATION —DENTAL LABORATORIES SECTION - - - - - - - 59

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Illustrations should be clearly numbered and legends should be written on a separate sheet of paper and not put on the backs of the originals. Each figure should be referred to in the text. Prints are preferred to X-ray negatives and should be on glossy paper. Lettering which is to appear on illustrations is best shown on an overlay or rough sketch. It should not be put on the original.

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THE
DENTAL PRACTITIONER

A Monthly Journal for the Practitioner and his Staff

Vol. II, No. 2 October, 1951

EDITORIAL

WE'LL BE THERE!

On Monday, Oct. 29, at 10 a.m., Mr. J. M. Hooker, President of the Association of Dental Manufacturers and Traders of the United Kingdom, will officially open the British Dental Trade Exhibition, which is being held at the Horticultural Halls, Vincent Square, London, S.W.1.

This year the Exhibition will be larger than ever before and your Editorial Committee will be present in force to read, mark, learn, and inwardly digest as much as possible so that we can give you in our next number full information, etc., on the exhibits. With a view to helping those of our readers who cannot get to the Exhibition, and also those who cannot spare sufficient time to see all of it, we hope to be able to present a very full report, and in this respect have already received much support from the organizing committee and a number of the exhibitors. To them, and especially to Mr. G. W. Martin, the General Secretary of their Council, go our grateful thanks.

THE PRESENT NUMBER

The second and final part of Mr. Hodson's article, the result of his own research, will be found in this number and we feel sure that all readers will wish to join with us in offering to him our sincere congratulations on some very excellent work.

THE S.I.M.A. SUPPLEMENT

This month readers will find a most interesting article by Mr. R. Mather on "Costing". This article should be read by all who have a dental laboratory, whether it be a small one with a single technician or a large one employing many persons. Perhaps some of you will find something in it to criticize, in which case please put your criticisms in writing.

IT'S UP TO YOU!

We have often asked, and we now ask again, readers to send in their ideas to us. If you do not agree with *something* in our Journal then you have cause to write to the Editor, who will be delighted to hear from you and to know your wishes.

On Oct. 25 you will have the opportunity of choosing your representative in the House of Commons and therefore of deciding government policy. Obviously the governing body of this Journal has already been decided, but we can, and do, give you every opportunity to direct its policy. It is really up to you.

A NEW PRESENTATION OF SOME COMMON FEATURES OF THE STRUCTURE OF HUMAN ENAMEL

(*Continued from page* 15)

By **J. J. HODSON**, L.D.S. R.C.S. Edin., B.D.S. Sheff.

Department of Oral Pathology, Sheffield University

IN the last issue of the DENTAL PRACTITIONER the enamel cuticle and lamellæ were discussed. We shall now consider some of the structures which lie on either side of the amelo-dentinal junction.

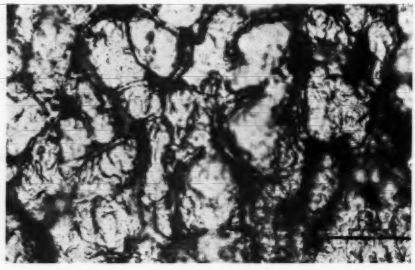

Fig. 33.—A high magnification of part of the surface of decalcified dentine showing dentinal craters. Stained eosin. W, Crater walls. (× 288.)

DENTINAL SURFACE

The enamel forms a covering to the dentine. The peculiar scalloped surface of the dentine seen at the amelo-dentinal junction in sections is well known.

If the surface of the dentine is highly magnified, a clearer picture is obtained of the means whereby the enamel is fixed to the dentine. *Fig.* 33 shows such a picture, and it will be seen that the surface is made up of a vast number of craters or depressions. These are of variable size and the size sometimes seems to be related to positions. For instance, they tend to be large near bends, as, for example, the labial-proximal bend. The enamel substance fits into the craters, and a view of the base of the enamel shows the counterpart of the dentinal craters. If the enamel is decalcified and the action stopped as the surfaces of the craters are reached, a picture such as that in *Fig.* 34 is obtained. In view of the increased rate of spread of dental caries along the amelo-dentinal border, it is obviously important to know something about the structure of this area.

AMELO-DENTINAL CUTICLE

A linear or membranous-like area of the enamel matrix is frequently found at the base of enamel in decalcified sections in a similar form to that at the enamel surface. It is not a different structure, but merely a particular area of the same matrix found throughout the enamel. It is in many, if not most cases, hypocalcified. No one, to my knowledge, has ever removed this cuticle-like membrane and demonstrated it in the form of a spread preparation, as has been so commonly done with the

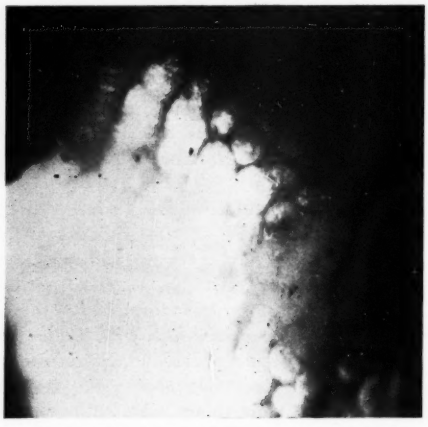

Fig. 34.—Partially decalcified amelo-dentinal area showing columns of enamel lying in the dentinal craters. Stained eosin. (× 40.)

surface cuticle. One of the best ways of doing this is to partly decalcify the enamel of a fully erupted tooth with a formic-acid methyl alcohol solution (75 per cent of 50 per cent formic acid in absolute methyl alcohol) and remove it from the dentine and then quickly stain it with alcohol eosin. With this procedure it will be found that the amelo-dentinal cuticle (and tufts) will stain, whilst the residual

Fig. 35.—A portion of partly decalcified enamel showing the amelo-dentinal cuticle (C). Formic-methyl-alcohol decalcification. Stained eosin. (× 40.)

calcium phosphate will not stain. *Fig.* 35 shows the pink cuticle lying against the white, partly decalcified enamel. Under the dissecting microscope this can now be dissected off and a spread preparation made (*Fig.* 36). The structural features, which do not show up well with eosin, consist of the ends of the enamel rods and a granular material. This latter is a not infrequent structural feature of the first formed enamel matrix. Another method of studying the layer is to remove part of the amelo-dentinal cuticle, or find an area where a portion has remained on the dentine, so that in the same piece of enamel the cuticle is present in one half and absent in the other. The piece of enamel is then passed into wax and sectioned. When the section is on the slide, the residual calcium phosphate is removed by dilute acid. The amelo-dentinal border, both with and without the cuticle, can then be studied (*Fig.* 37). There are a number of other methods which may be used, and we might

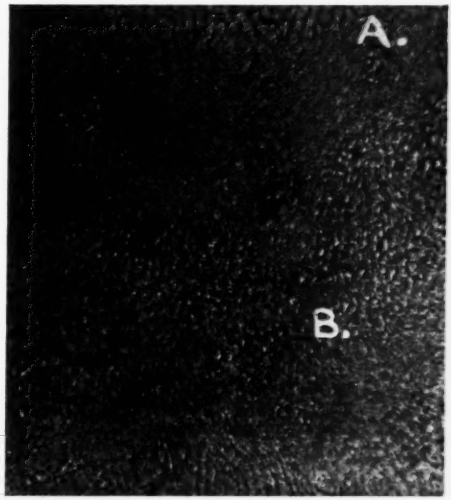

Fig. 36.—Spread preparation of amelo-dentinal cuticle showing ends of enamel rods at A, and granular material at B. Formic-methyl-alcohol decalcification. Stained eosin. (× 390.)

just mention one of them. If the enamel is decalcified with a fairly strong acid-alcohol solution (15–25 per cent HCl in methyl alcohol),

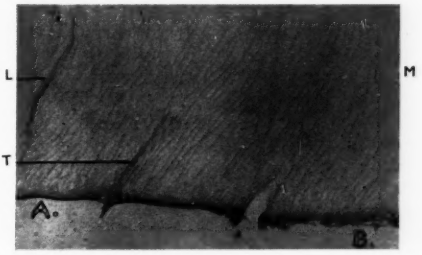

Fig. 37.—Longitudinal section of erupted enamel near amelo-cemental junction showing amelo-dentinal cuticle present at A and absent at B (*see text*). Formic-methyl-alcohol decalcification. Stained Heidenhain's hæmatoxylin. M, Chromophobic enamel matrix; T, Tuft; L, Lamella. (× 260.)

only the highly organic areas of the matrix will be retained. If the tufts, which we shall consider later, are dissected from the dentinal surface with the cuticle intact and then

sectioned, the latter will be seen as a fine line below the tuft matrix (*Fig.* 38).

THE BASE OF THE ENAMEL

It is not easy to visualize the base of the enamel from a sectional view showing the dentinal craters and the enamel tufts along the

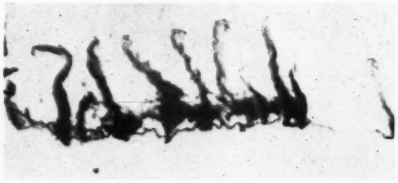

Fig. 38.—Part of a section of a dissected clump of tufts, somewhat compressed, showing amelo-dentinal cuticle. Hydrochloric-methyl-alcohol decalcification. Stained Heidenhain's hæmatoxylin. (× 186.)

line of the amelo-dentinal cuticle. Practically no work has been done on the gross appearances of this surface since that of Beust (1924, 1926, 1932). I do not propose to go into any

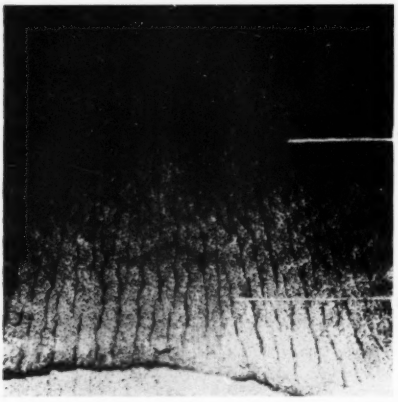

Fig. 39.—A ground section showing the dentinal surface of enamel. Unstained. BT, Base of the tuft bands; WT, Wavy tuft bands. (× 36.)

detail—that is not the purpose of this paper—but it may be of interest if I indicate some of the features of this surface. If a fairly flat area, say from the approximal surface of a molar, is cut off and the dentinal aspect ground until the base of the enamel is reached, a picture similar to that shown in *Fig.* 39 will be obtained. Students of enamel structure will recognize the linear markings which Beust described many years ago as the "hila" through which passed the so-called tuft fibrils which he considered to be of a "capillary" nature. It will be appreciated that sections such as that shown cannot be ground very thinly, and therefore it is impossible to study the details of such a surface in the calcified state.

When the enamel is decalcified so as to retain only the major organic areas, it is frequently found that large areas of the amelo-dentinal

Fig. 40.—A dissected layer of tufts showing tuft bands seen through the amelo-dentinal cuticle. Note the similarity to *Fig.* 39. Hydrochloric-methyl-alcohol decalcification. Stained eosin, embedded in gelatin. (× 36.)

matrix are retained, i.e., the tufts, the inter-tuft matrix, and the basement area or the amelo-dentinal cuticle. If this matrix is dissected from the dentinal surface of, say, an approximal or buccal surface of a molar or premolar and turned upside down and photographed from the base, we find a gross structure similar to that seen in the calcified preparation (*Fig.* 40). The next illustration (*Fig.* 41 C) shows a similar piece of matrix dehydrated, cleared, and photographed through the amelo-dentinal cuticle. We can now see a little more detail. This would seem to be the first time that the base of the enamel matrix has been demonstrated. Here I have

put together a composite illustration showing the base of the enamel, with a ground section and a decalcified section of a similar area. that besides the linear markings there are some depressions which closely follow the tuft bands. These are somewhat deeper projections of the

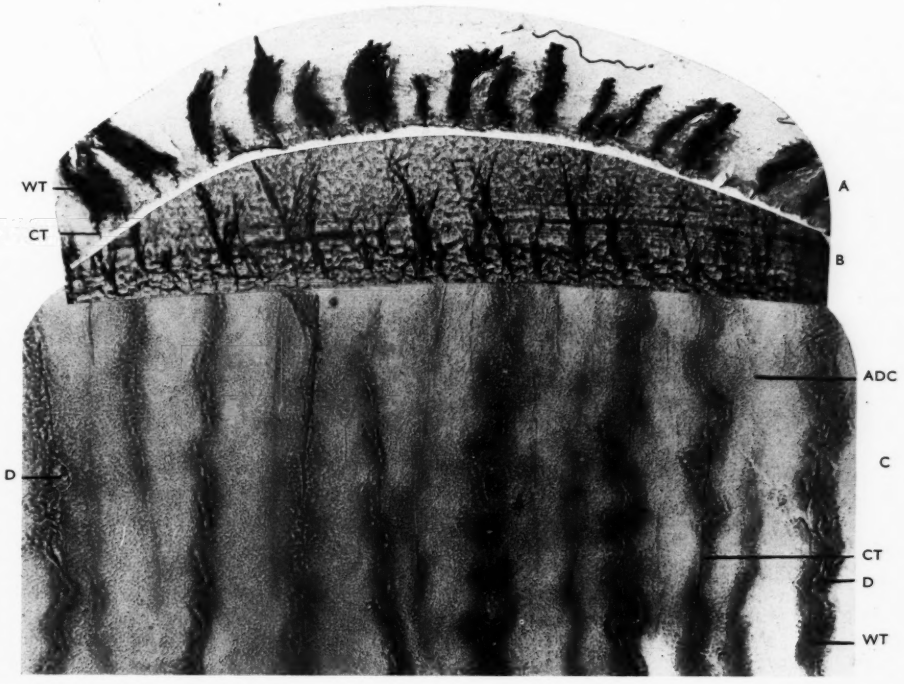

Fig. 41.—A composite photomicrograph showing:—
A, Part of a transverse section of a layer of dissected tuft bands. Heidenhain's hæmatoxylin.
B, Part of a ground transverse section of a molar unstained.
C, Dissected layer of amelo-dentinal matrix photographed from the underneath or dentinal surface and focused on the amelo-dentinal cuticle. Hydrochloric-methyl-alcohol decalcification. Stained eosin.
ADC, Amelo-dentinal cuticle; CT, Central tuft zones (or stalks); D, Indentations formerly occupied by dentine projections. WT, Wavy tuft bands. (× 73.)

In the gross view we see a series of wavy bands, at the base of which are some dark linear markings. The section views show that the wavy bands belong to the classical tuft appearance and that the linear markings or central tuft zones are the so-called tuft stalks of Meyer (1935). Now where are the convexities of the enamel matrix which fit into the dentinal craters?

It was found that the dissection technique tended to stretch the matrix and thus the impressions of the dentinal craters were straightened out. It will be noticed, however, walls of the dentinal craters into the enamel matrix. There are a number of variations in the pattern of the enamel base. With extreme care it is often possible to dissect occlusal enamel matrix so that the crater impressions are retained. *Fig* 42 shows a section through such an area. The tufts here are seen chiefly as linear areas.

THE ENAMEL TUFTS

From this stage let us now pass on to a consideration of the enamel side of the amelo-dentinal cuticle and examine first the gross

picture of the tufts. *Fig.* 43 shows the tufts as bands of matrix on the buccal aspect of a cuspal area of a molar just prior to eruption.

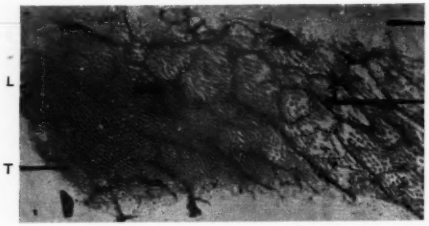

Fig. 42.—A decalcified transverse section of the base of a portion of enamel matrix dissected from the occlusal surface. Hydrochloric-methyl-alcohol decalcification. Stained Heidenhain's hæmatoxylin. DC, Reproduction of the outlines of the dentinal craters; T, Enamel tufts; L, Amelo-dentinal end of a lamella; ASM, Acid soluble matrix. (× 142.)

This is a view of the top of the wavy bands photographed through the surface cuticle. If

Fig. 43.—Cuspal area of a micro-dissection preparation of an unerupted molar showing the tuft bands in situ. Photographed through the enamel cuticle. Hydrochloric-methyl-alcohol decalcification. Embedded in gelatin. Stained eosin. (× 36.)

instead of completely decalcifying the enamel, we stop the action as the cusps are dissolved we can see the relation of the bands to the calcified substance. *Fig.* 44 shows the bands as they appear looking down on two cuspal areas of a molar. The bands travel at right angles to the incremental lines and converge towards the summit of the cusps. *Fig.* 45 shows a dissected layer of tuft bands from the buccal aspect of a fully erupted molar. Each band can be dissected out and this also can be dissected into two or more leaves or layers of enamel matrix (*Fig.* 46). Like the lamellæ the tufts have been described in the literature

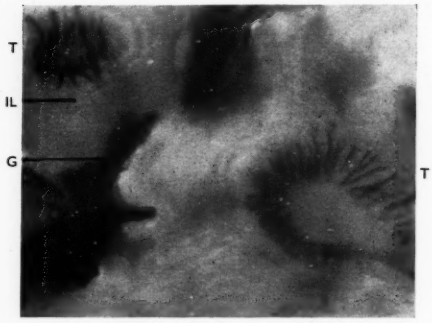

Fig. 44.—Showing part of the occlusal surface of an erupted molar. The decalcification was stopped when cuspal areas were freed of enamel. The tuft bands (T) are seen in relation to remaining enamel. Hydrochloric-methyl-alcohol decalcification. Stained eosin ; embedded in gelatin. IL, Incremental layers; G, Occlusal groove areas. (× 15.)

in various ways: Meyer (1935) describes them as leaves of inter-rod substance with a central stalk feature; Beust (1926) calls them fibril structures concerned with metabolism: Gustafson (1945) sees them as less mineralized "rod sheaths"; Orban (1928) views the tuft-like shape as an optical illusion due to the projection on to one plane of incompletely calcified enamel substances lying in different planes. Sognnaes (1949), who also successfully isolated the wavy tuft bands, interpreted them in longitudinal sections as densely packed "rod sheaths" in the centre of which were some "patent structures". Lehner and Plenk (1936) described them as poorly calcified enamel rods.

My investigations show that all the tufts cannot be described in terms of one particular feature. They have their basis in the organic matrix, but become most apparent during the

final stages of amelogenesis and the progress of calcification. I have studied many aspects of their development and morphology, the details of which you would probably find very boring. There are, however, three main characters which I shall mention:—

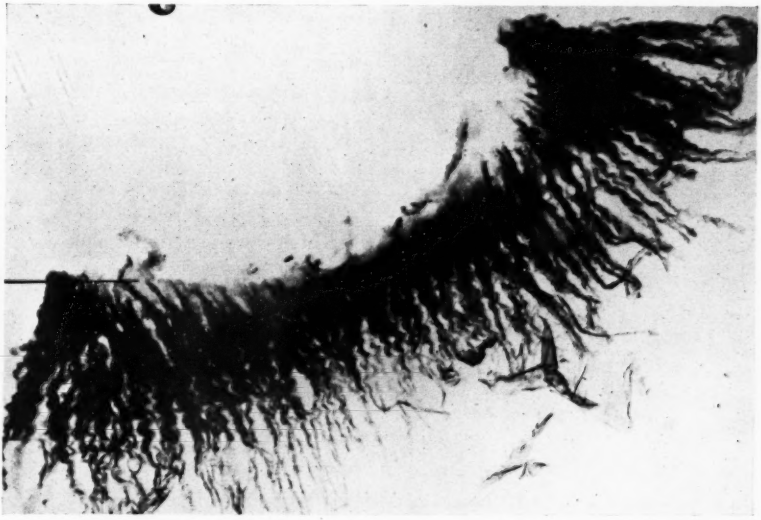

Fig. 45.—Layer of tuft bands dissected from the buccal surface of an erupted lower molar. Hydrochloric-methyl-alcohol decalcification. Stained Heidenhain's hæmatoxylin; embedded in gelatin. ADC, Amelo-dentinal cuticle. (× 18.)

1. Hypocalcified enamel rods, the organic content of which is of an early developmental character and which varies in amount and properties. They may be either of normal structure or of abnormal or atypical structure.

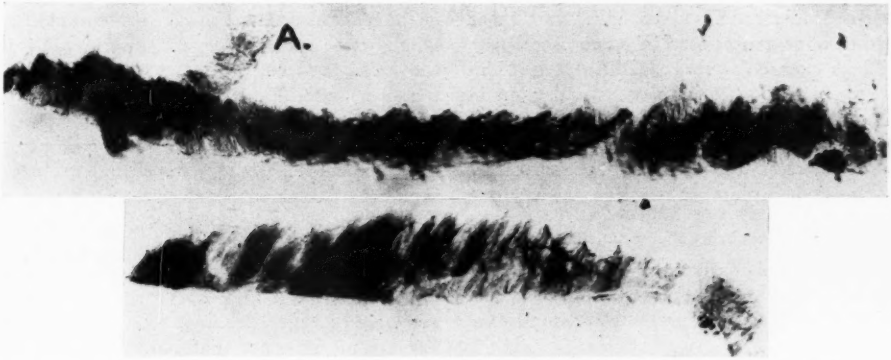

Fig. 46.—The upper photograph shows part of a tuft band dissected from a layer similar to that shown in *Fig.* 45. (× 85.) The lower is a layer of matrix similar to that at A, dissected from the main band. The difference in size is due to different specimens in different situations. (× 48.) Stained Heidenhain's hæmatoxylin.

2. The tuft stalk or a central area of organic material which generally lies between the rods, but is not usually of the dimensions and character of the usual inter-rod organic material. It is generally composed of low or uncalcified granular material which has not taken part in rod formation.

3. Deeply staining organic material located in the cortical areas of the rods and in the inter-rod substance. These give the linear or fibril appearances seen in ground sections.

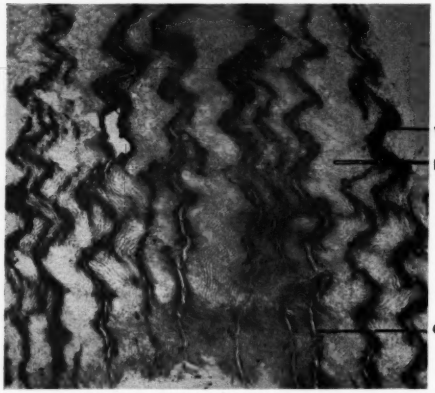

Fig. 47.—A transverse section (parallel to the dentine) of a layer of tuft bands similar to *Fig.* 45. Stained Ehrlich's hæmatoxylin and eosin. CT, Central tuft zones slightly split; WT, Wavy tuft bands; IM, Intertuft matrix. (× 82·5.)

These characters vary in different teeth in the same and different mouths and even in the same section. The classical type of tuft contains all three features; others may contain one or more. On the other hand, the tufts may be absent in a number of places in any one crown.

One point must be stressed, and it is that the seemingly simple outline of the tufts in ground section is found to have an organic basis which in decalcified sections presents a complicated picture.

You will recall the illustration I showed of the dissected layer of tufts (*Fig.* 45); if this is passed into wax and the *tufts sectioned transversely*, i.e., across the tuft bands, parallel to the dentine, a more detailed picture of their structure can be seen (*Fig.* 47). Here we see the wavy, deeply staining bands and the lesser staining inter-tuft matrix. In those bands which have been cut nearer to their base, i.e., the centre ones, we see a slight separation which represents the tuft stalk area. It will, of course, be realized that the layer of tuft bands is convex as it follows the curvature of the crown and therefore a transverse, section will cut the bands at different levels. *Fig.* 48 shows a high magnification of part of two bands and the matrix between them. Here can be seen the highly organic rods completely filled with organic material of an early secondary stage type, giving way to smaller areas probably according to the degree of calcification. Still using the same type of dissected material, let us take a longitudinal section of tuft bands (i.e., as they would appear in a transverse section of a molar crown). *Fig.* 49 is a higher power of part of the decalcified tufts seen in the composite picture (*Fig.* 41 A). Here we have an example of tufts with all three characters, organic rods, linear areas, and a central stalk. *Fig.* 50 shows the similar appearances in the matrix of a developing first permanent molar at 13 months. We will, however, leave the organic rod component and pass on to a brief word about the tuft stalk.

This, as we have seen, is visible at the base of the matrix. It is not always present, neither is it always central. In preparing sections of the tufts, it is very liable to split, and this, together with its deep staining qualities, makes it difficult to interpret. It has been found that in perhaps the majority of cases, this zone contains low or uncalcified granular material. It is sometimes found that Mallory's triple stain will differentiate the central tuft zone from the remainder of the tuft unit. *Fig.* 51 shows a very high magnification of one of the serial sections of the same tufts shown in *Fig.* 49. The illustration clearly shows the organic granular material. (Mistaken by Beust for fibrils.) *Fig.* 52 shows a section through a tuft area parallel to the dentine. A basophilic tract, probably a central tuft zone, is seen passing down the side of the rods, then crossing the inter-rod area and passing down the side of the opposite rod

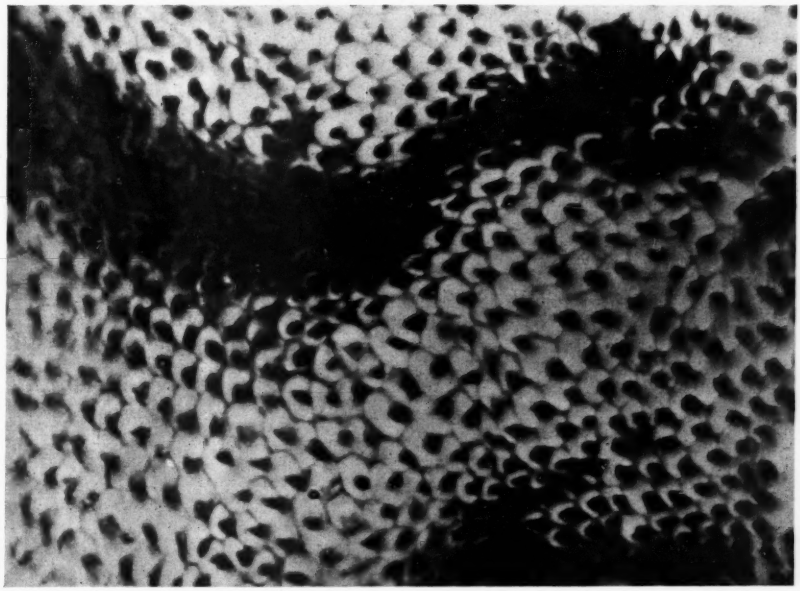

Fig. 48.—A high magnification of part of one of the serials from *Fig.* 47. Note the immature full rod matrix giving way in this case to lesser degrees of organic content. Stained Heidenhain's hæmatoxylin and eosin. (× 1230.)

Fig. 49.—A higher magnification of part of the tuft bands shown in *Fig.* 41 A. The deep staining matrix, central tuft zones, and paler staining inter-tuft matrix can be distinguished. Stained Heidenhain's hæmatoxylin. CT, Central tuft zones; ADJ, Amelo-dentinal junction. (× 214.)

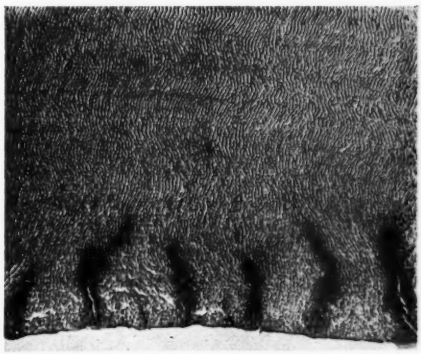

Fig. 50.—Showing the tuft bands in the matrix of a developing first permanent molar at about the end of amelogenesis. The bands retain the stain whilst the remainder of the matrix is becoming paler owing to the progress of calcification. The amelo-dentinal cuticle is visible. Hydrochloric-methyl-alcohol decalcification. Stained Mallory's Trichome. (× 106.)

surfaces; farther down it occupies the complete inter-rod area. You will remember that part of a lamella of similar form was shown (*Fig.* 30),

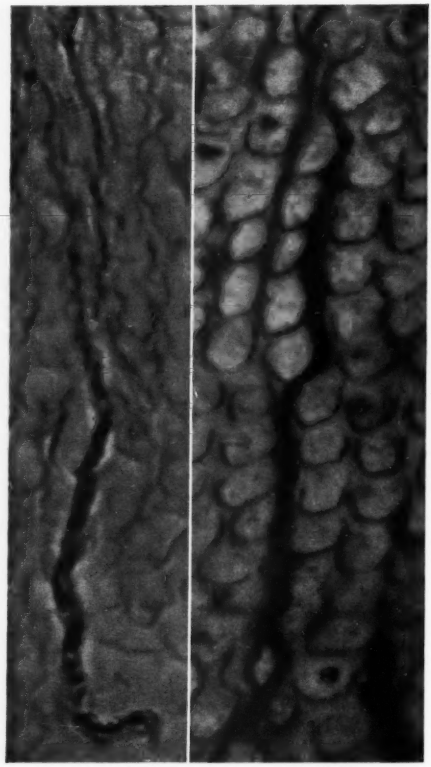

Fig. 51. *Fig.* 52.

Fig. 51.—This shows the central tuft zone from the same series as *Fig.* 49 differentially stained. Note the granular contents. Stained Mallory's trichome. (× 2200.)

Fig. 52.—A transverse section parallel to the dentine through a central tuft zone showing one variation of the path of the organic substance in relation to the rods and inter-rod substance (*see text*). (Cf. *Fig.* 30.) Formic-methyl-alcohol decalcification. Stained Heidenhain's hæmatoxylin. (× 2200.)

but here you will notice that there are much wider inter-rod areas throughout the field. The "inter-rod area" accommodating the tract is somewhat wider than elsewhere.

In order to study the linear or fibril-like component, we will take a histological section where this forms the principal element, i.e., where the organic rod component is absent. This type of tuft is not suitable for micro-dissection technique since the highly organic part is much less than in the type we have previously considered. The decalcification technique used must therefore be of the type which will permit of the retention of the maximum amount of recoverable matrix. For this purpose I use the formic-acid methyl alcohol solution previously mentioned. *Fig.* 53 shows a section of a proximal surface of a molar cut in the same plane as *Fig.* 47. Here

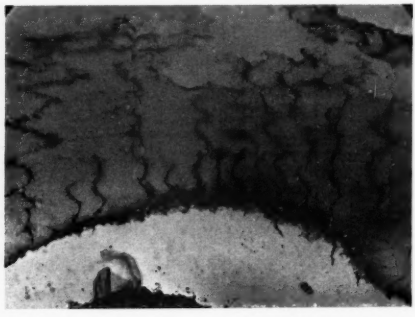

Fig. 53.—Part of a transverse section of the tuft bands (i.e., longitudinal, bucco-lingually, parallel to the dentine) on an approximal surface of an erupted premolar. This shows chiefly the linear type (*see text*). Formic-methyl-alcohol decalcification. Stained Heidenhain's hæmatoxylin. (× 60.)

again the curvature of the tooth is such that the tufts are cut near their surface at the top of the illustration and towards their base as the knife penetrates the dentine. The illustration shows a marked absence of the organic rods seen in the previous sections. There are, however, a series of deeply staining wavy bands. A higher power (*Fig.* 54) of part of one of these areas near the top of the photomicrograph shows them to be composed of organic material chiefly in the rod cortex (or sheath) area, but also in some places including and traversing the inter-rod areas. The more usual sectional plane of this type of tuft is shown in *Fig.* 55.

It will be seen from the very rough sketch of some of the features of the tufts that, though common features of enamel structure, they are,

like the lamellæ, essentially of a defective nature. It can be demonstrated that they are, in fact, merely a variation of types of defects which are found in many other places than at the amelo-dentinal junction. Nearly fifty years ago Caush (1904) associated similar appearances at the surface of the enamel. It is the peculiar spiral form of the enamel rods seen in sections (except at the amelo-cemental region) together with the varying position of granular organic substances in the tuft zone which accentuates the defect and which has made their interpretation so difficult.

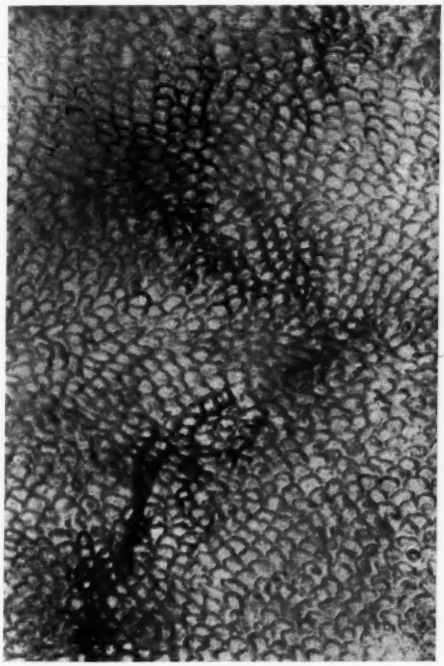

Fig. 54.—A higher magnification of part of the top of one of the tuft areas in *Fig.* 53. Note that in the main the organic tracts are in the rod cortex. (× 640.)

There are no special fibrils in the tuft structure, neither are they physiological structures concerned with vital metabolic processes. Once the crown is completely formed, the fact that they are permeable does not apparently lead to any further maturation. A little additional calcium amongst other factors may, however, decrease their permeability.

Fig. 55.—Part of a transverse section of the crown of an erupted premolar, showing the linear type of tuft (tufts cut longitudinally). Formic-methyl-alcohol decalcification. Stained Heidenhain's hæmatoxylin. (× 167.)

It will be clear that certain features, such as the rod cortical path, or the central tuft stalk lying between rods, are completely reproducible in the lamellæ. The two structures therefore show both similar and different characters according to the various types. The wide type of organic tract seen in some lamellæ is rarely seen in a tuft unit; on the other hand, the type of hypocalcified, immature rod component seen in the tufts is not found in the lamellæ. It will also have been noticed that the organic material is commonly arranged in a half-moon shape in the tufts and lamellæ. This shape is found in many other areas in the enamel and is not limited to cross-section views. It is more than interesting to recall the half-moon shaped "enamel capillaries" of Beust (1932); the crescent or horseshoe form of deeply staining "rod sheaths" described by Williams (1923) in mottled enamel, early caries, and in fully formed but unerupted teeth, also his canals in the enamel; the boundaries of lamellæ formed by thickenings of the "rod sheaths" at the expense of the rods, described by Bodecker (1928); the crescent-shaped lines in the tufts and the sickle-shaped parts of lamellæ described by Gustafson (1945); and the arcades of caries penetration described by Gottlieb (1947).

SUMMARY

1. The enamel cuticle is found not to be any separate structure, but a surface manifestation of the outer limit of the enamel matrix and represents a surface form of incremental line. Its structure is similar to, and continuous with, the outer rod areas, and incremental lines demarcating hypoplastic and other areas of the matrix.

2. A general account of the enamel lamellæ is given—their gross and microscopical appearances, surface markings, distribution, and their variations. A number of morphological types are described and evidence presented to show that most originate during the final stages of matrix development. A common form is that of a crack during development.

3. The gross appearances of the dentinal surface are described.

4. The amelo-dentinal cuticle is found to be merely the base of the enamel matrix. The gross and microscopical appearances are discussed. The cuticle is demonstrated for the first time as a spread preparation.

5. The base of the enamel in ground and decalcified material is described.

6. The gross and microscopical appearances of the enamel tufts are discussed. A micro-dissection technique shows them in one of their forms as wavy bands of organic enamel matrix which can be dissected into thinner leaves. Microscopically their appearances vary according to the type, position, and presence of organic material representing a low degree of calcification. Like the lamellæ, they are essentially of a defective nature.

I must thank Mr. M. Rudland, F.I.M.L.T., chief technician to the Department of Oral Pathology, for his technical assistance.

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MODERN PLASTER PRODUCTION*

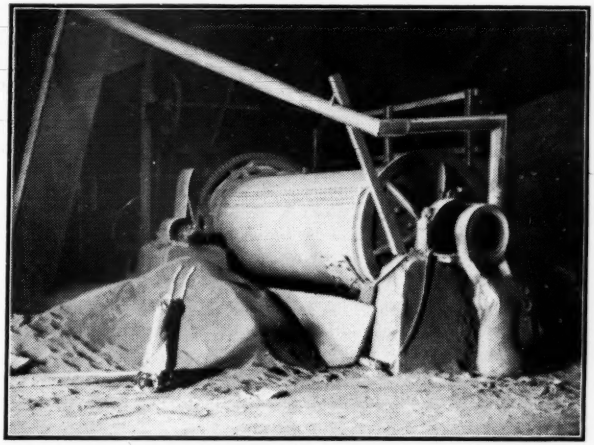
THE MANUFACTURE OF PLASTER-OF-PARIS, AND ITS USES

By **J. F. STIRLING**

THE mineral gypsum is one of the world's common commodities. Almost every country has its own natural resources of this nowadays indispensable material. Available figures over the last quarter century show that the world's annual output of gypsum products has centred around ten million tons, the average British production for home consumption averaging about one million tons per year.

Clearly, therefore, gypsum is an important substance. It is a very interesting material, also, viewed from a scientific aspect, and its technical and everyday applications are almost without number.

It must have been in very ancient times when someone made the chance discovery of the fact that this white mineral earth, after it had been powdered and heated, could combine with water and set to a solid mass. Yet such a discovery forms the basis of all our present-day common plasters, and just because the large natural deposits of this mineral at Montmartre, near Paris, were employed locally for the extensive manufacture of a hydraulic or water-setting plaster the prepared material somehow or other obtained for itself the name of *plaster-of-Paris*, although, apart from this chance association, the material has nothing whatever to do with the French capital.



A slow-speed revolving steel cylinder or "tube mill" used for the fine grinding of industrial materials such as limestone and gypsum.

Gypsum is nothing more nor less than calcium sulphate, $CaSO_4$. Its name is a Greek one, meaning chalk, although in actual fact it has nothing in common with chalk, which is calcium carbonate, apart from its superficial white appearance.

Raw Gypsum.—Native gypsum occurs in a loose combination with water. Its chemical formula is $CaSO_4 2H_2O$. Even in this "raw" state gypsym has a number of important uses. Under the guise of *terra alba* (white earth) or "mineral white", it functions as an important filler for paper and cotton fabrics, as an

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"extender" for distempers and paints, as a dusting powder for scattering in mines in order to keep down explosion risks, as an inert medium or diluent for the modern highly potent insecticidal powders of the "Gammexane" type, as an ingredient of Portland cement in order to retard its setting-time, and even as a means of improving (or "Burtonizing", as it is called) the water used for the brewing of ales.

When the gypsum is found in clean, nicely coloured, fine-grained masses it is called *alabaster* (the name is said to be derived from Alabastron, a town of ancient Egypt where there were quarries of this material), a mineral which is used mainly for ornamental purposes. There is also a crystalline variety of gypsum which is almost transparent and which is called *selenite*, from the Greek *selene* (the moon), in reference to its soft, pearly lustre.

(*Above*) Stout wire netting gives additional strength to a concrete road.

(*Left*) Painting a plaster statue with a solution of wax in benzene to impart a surface lustre to the cast.

It is, however, after the common native gypsum has been converted into plaster, or "plaster-of-Paris", to give the prepared material its more conventional name, that it attains its most important uses.

Plaster-of-Paris is very simply manufactured. The native gypsum is screened from all other earthy matters. It is roughly crushed, dried to remove obvious moisture, and then ground to a fine, impalpable powder either between stones (the old-fashioned method) or in a revolving cylinder known as a "tube mill", in which hard steel balls pound the white material to particles of extremely small size.

Next comes the "boiling" of the powdered gypsum. This is a curious term to use for the treatment of a powder, but the powdered gypsum is charged into iron containers called "kettles", in which it is carefully heated and in which the escape of the chemically combined water gives the gypsum powder the appearance of a boiling liquid.

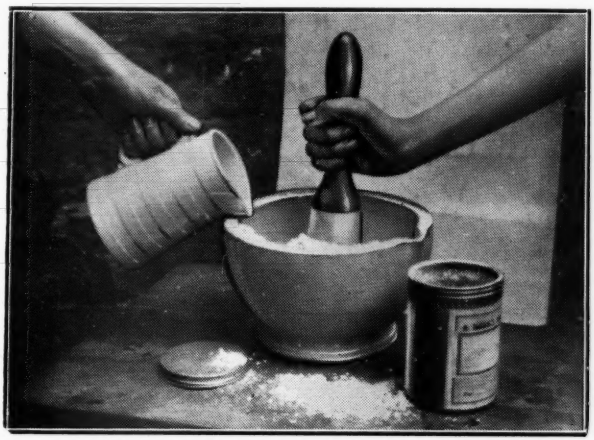
This boiling must be very carefully done, to which end the material is agitated during the whole of the process. The temperature must be kept around 130° C. If it is allowed to rise considerably above this mark the whole of the water contained in the gypsum is driven off and the material is said to be burnt. As such it consists of anhydrous calcium sulphate, $CaSO_4$, and it becomes useless for ordinary plaster purposes since it will only recombine with water very slowly and with the greatest reluctance, requiring days or even weeks for its setting.

It is important, also, to see that only very high-grade raw gypsum is used for plaster manufacture, for if the crude material is contaminated with other substances, such as chalk or china clay, which do not take part in the controlled dehydration, these inert materials will remain in the finished plaster and will thus dilute it, taking away from it serviceability and strength.

How Plaster Sets.—The precise chemical and physical mechanism underlying the setting of plaster-of-Paris is not difficult to understand. Let us consider it in this manner: We have already seen that the composition of native gypsum (calcium sulphate) is represented by the formula $CaSO_4 2H_2O$. In this formula the "H_2O" represents the water content of the material, and the water expression "$2H_2O$" signifies that in native gypsum each molecule of calcium sulphate, $CaSO_4$, is combined naturally with two molecules of water. Hence we obtain the formula, $CaSO_4 2H_2O$. Chemically speaking, this is the *dihydrate* of calcium sulphate since it contains two molecules or units of combined water.

Now, when this dihydrate (which is natural gypsum) is heated to a temperature around 130° C., a portion of its combined water is driven off, and thus it is converted into what is known as the "hemihydrate", having the formula $CaSO_4 H_2O$. This hemihydrate is the white powder which we know as plaster-of-Paris.

The actual "transition temperature" at which the dihydrate changes into the hemihydrate is 108° C. (that is just over the boiling-point of water), but in practice, to make sure of the action being complete, the plaster-of-Paris is manufactured at about 130° C.



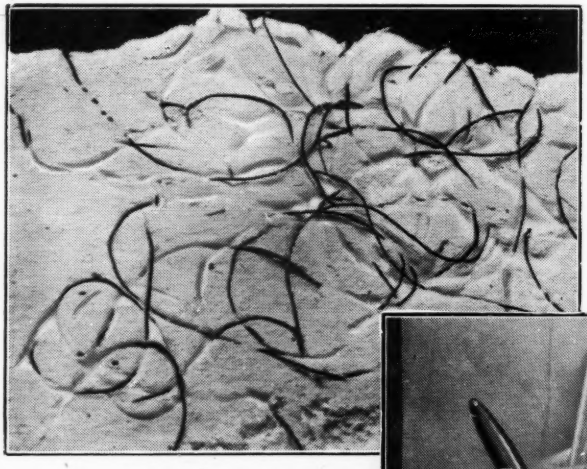
Gesso, a simply-made plaster material which is produced by slaking plaster or whiting with glue water.

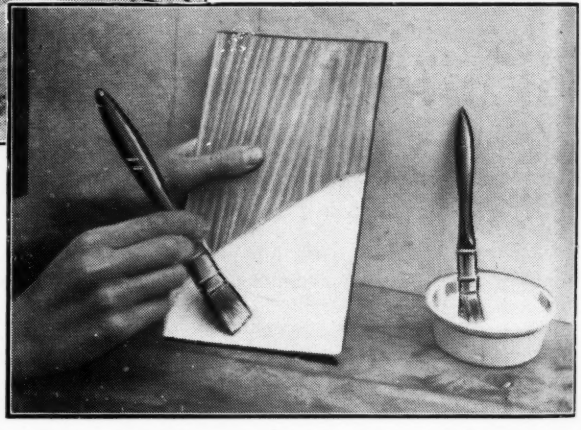
You see now why this matter of temperature is so important in plaster manufacture, because if 130° C. is substantially exceeded the remaining water in the hemihydrate (plaster-of-Paris) begins to be driven off, so that ultimately (and very definitely at temperatures above 200° C.) there is produced the completely dehydrated calcium sulphate, consisting of $CaSO_4$ and nothing more.

Anhydrite.—The completely dehydrated material is known as "anhydrite". Although it is useless for plaster purposes, it is becoming a substance of increasing industrial importance, for which purpose it is sometimes manufactured synthetically. It can also be obtained from natural sources. Its industrial importance results from the facts that sulphur for the manufacture of sulphuric acid can be obtained

from it, and that by treatment with nitrogen it can be turned into "nitro-chalk", a valuable fertilizer, and also into ammonium sulphate, another fertilizer, by reaction with synthetic ammonia made from the nitrogen of the atmosphere.

We must, however, resist the temptation to explore these interesting chemical by-ways and return to our main theme of plaster-of-Paris and its setting mechanism.





(*Above*) Sectional view of a plaster block reinforced with horsehair. (*Right*) Liquid plaster, which is merely a thin gesso, brushed over a wood panel to provide a smooth white surface.

When the calcium sulphate hemihydrate, $CaSO_4H_2O$, is treated with an amount of water, it not only absorbs the water but it chemically retains it. That is to say, the added water is not merely mechanically mixed with the white powder but it actually enters into chemical combination with it. The result of this process is a reconversion of the hemihydrate, $CaSO_4H_2O$, into the dihydrate, $CaSO_42H_2O$. Such is the principle of the setting of plaster-of-Paris.

Good plaster-of-Paris is not a pure substance in that it does not consist solely of the hemihydrate. The latter makes up its greatest bulk, but it also contains some unchanged dihydrate and a little of the completely anhydrous or water-free sulphate.

Now, the anhydrous calcium sulphate, although only sparingly soluble in water, is more soluble than the dihydrate, so that when water is added to plaster-of-Paris the anhydrous calcium sulphate partially dissolves in the water and becomes converted to the dihydrate. This crystallizes about the undissolved particles of dihydrate in interlocking needle-like crystals. The dihydrate which results from the absorption of water by the hemihydrate also crystallizes in needle crystals which interlock firmly and so give rise to the solid mass of "set" plaster. It is probable that the unchanged particles of dihydrate in the plaster form nuclei about which the reformed dihydrate crystallizes and interlocks.

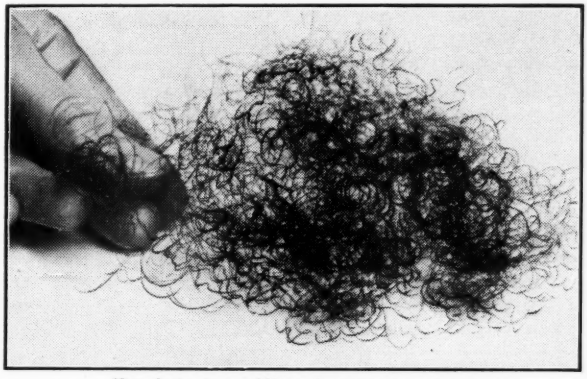
The setting of plaster-of-Plaster is accompanied first by a *contraction* of the mass of material, but this is followed by an expansion which is due to a change from the crystal system of the hemihydrate into the bulkier crystal form of the dihydrate. So that, as a final result, the plaster expands very slightly on setting, a fact which makes it so admirably adapted

for the taking of sharp castings and for similar accurate work.

Retarding the Setting.—If the water used for the slaking of the plaster contains any substance which can possibly interfere with the formation of dihydrate crystals, such a substance will retard the setting and even actually prevent it. All colloid materials have this retarding property because it is not easy for anything to crystallize when it is interspersed with jelly-like matters. Hence, if we dissolve glue, gelatine, starch, gums, or any similar substance in the slaking water of plaster-of-Paris the setting of the plaster will be retarded in proportion to the amount of colloid which is present. If an excess of such colloid material is present the plaster will not set at all.

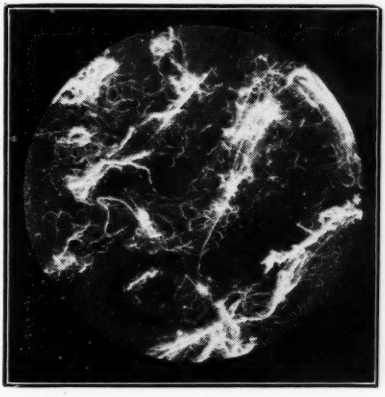
The Romans must have had some knowledge of this property, for it is reported that they used animal, and maybe human, blood to slow down the setting of their plasters.

Conversely, if we dissolve in the plaster slaking water anything which will tend to crystallize, the internal crystallization of the plaster, and therefore its setting time, will be speeded up. Thus materials such as common salt (sodium chloride) will *accelerate* the setting of plaster. Indeed, anything which materially increases the solubility of the gypsum will do this. Weak hydrochloric acid, acetic acid, tartaric, phosphoric, and citric acids all reduce the setting time of plaster, but borax and alum retard the setting.



Horsehair gives additional strength to concrete.

We have seen that when native gypsum is heated to about 200° C. it becomes converted into anhydrous calcium sulphate, $CaSO_4$, and in this condition is said to be "burnt". Such material, which, as we have further seen, may take long periods to set, is supposed to contain calcium oxide, CaO (quicklime), in addition to anhydrous calcium sulphate, the lime being dissolved in the sulphate and thereby forming a "solid solution". This material has been used under the title of "flooring plaster".



A microscope view of asbestos powder, showing the fibrous character of the material which aids the interlocking and "keying" of plaster particles.

If the gypsum is heated to about 600° C. not only is it completely dehydrated to anhydrous

calcium sulphate, $CaSO_4$, but the product refuses to reabsorb any water. The material, consequently, will not set, even after a prolonged period, when mixed with water. It is

A network of leaf-like crystals or "spheralites", similar to those which form in a setting mass of plaster-of-Paris, and by the continual spread and interlocking of which the plaster mass is given solidity and coherence.

said to be "dead burnt", in which condition it is without practical interest.

"Hard Finish" Plasters.—When native gypsum is calcined at red heat and the resulting anhydrous calcium sulphate is immersed in a bath of alum solution and again calcined and powdered, the product, when slaked with water sets comparatively slowly. In this condition, the plaster is known as *Keene's cement*. It is of the "hard finish" plasters, used for "skimming" or surfacing walls. A peculiarity about it is that the partially-set cement may be reworked with water and that, in these circumstances, it will set as well as if its first setting time had not been interrupted.

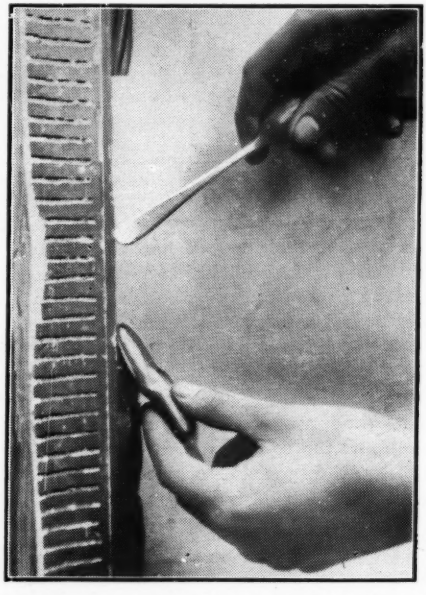
What is known as *Martin's cement* results when sodium or potassium carbonate, as well as alum, is used in the above process and the subsequent reheating is done at a higher temperature than that used for Keene's cement.

Parian cement is merely another of these "hard finish" plasters based on gypsum. It is made by treating the gypsum with borax solution in a similar manner to the above.

Plaster-of-Paris, after setting, is characteristically porous. It can, however, very readily be impregnated with agents such as size or glue solution, or with solutions of various common waxes, which not only give it increased strength but allow its surface to be painted on without subsequent absorption of the paint medium.

Plaster casts are notoriously brittle. Any of these impregnation processes at once decreases the brittleness of the plaster, as will also the incorporation with the plaster of a fibrous material such as asbestos powder.

For a really effective reinforcement of a mass of plaster, and for making it practically impossible to fracture the plaster mass completely,



Replacing missing pieces in a plaster picture-frame moulding by means of a plastic stick of gesso.

there is nothing like horsehair, the hair being padded or otherwise forced into the plaster mass in its wet stage.

Steel wool can be used for the above purpose, but there is a risk here of the surface being discoloured, particularly under conditions of dampness. It can, however, give an enormously tough plaster mass.

When slaking plaster-of-Paris it is better to add the plaster to the water than the water to

the plaster. Estimate the necessary quantity of water required. Then shake the plaster into the water by degrees, stirring continuously. Good plaster should have the consistency of thick cream. It will usually set solid within ten minutes, although the nature of the water has an influence on the precise setting time. It is not safe to remove a plaster from a mould under half an hour from its apparent setting.

To prevent the plaster from adhering to the side of the mould, the latter may be oiled or greased, but, in the case of statue work, where the grease would stain the surface of the casts, it is better plan to brush the mould surfaces with white of egg, and, after drying, to apply to the same surfaces a very thin cream of china clay mixed up in strong soapy water.

Good Gesso.—We have noted that when plaster-of-Paris is slaked with glue or gelatine water its setting can be delayed or completely prevented. If, however, sufficient glue is used the glue itself will harden, binding the plaster mass into a hard, unyielding mass.

There is, however, no need to use plaster of-Paris for this purpose. Common whiting will do equally well and the product is known as "gesso" (pronounced "jesso"), which is an Italian word for plaster.

Although gesso may not contain any plaster-of-Paris, it is excellent for amateur moulding work, but it has nothing like the quick setting time of true plaster-of-Paris and may, indeed, in large masses require up to a week to harden out.

To make good gesso, dissolve 1 part of high-grade glue in 12 parts of water. Add to this a few drops of carbolic acid to prevent the glue from going mouldy and thus destroying itself. This is the stock "gesso" solution.

As the gesso medium or "aggregate" you can use whiting alone, or whiting admixed with plaster-of-Paris, either or both with or without additional mixture of a colouring matter such as lampblack, red oxide, or ochre.

For the best work, the most satisfactory gesso aggregate is whiting mixed with about a quarter of its bulk of zinc oxide.

To make the gesso, all one has to do is to warm the gesso solution and to stir into it sufficient gesso aggregate to make a stiff paste which when moulded between the fingers will remain "put" and will not flow.

If the gesso is made to a thin cream consistency it may actually be brushed on to surfaces such as wooden panels, walls, fabrics, etc., thereby providing a coating which can be painted or drawn on.

A CASE OF LOCAL HYPOPLASIA OF THE SECOND UPPER PREMOLAR DUE TO TRAUMA

By **E. J. PERINT**, M.D., D.D.S. Hungary, L.D.S. R.C.S. Eng.

Female patient, aged 27.

She was injured in a sporting accident at the age of 9 years. The zygomatic bone was fractured, resulting in a deformity of the affected side with compression of the arch. The deciduous teeth $\frac{D\,E}{}$ were removed because of the injury and resulting inflammation of the gum. The first premolar erupted at the age of 12 years and the second premolar two years later. The second premolar had the appearance, clinically, of a deciduous tooth, and showed marked hypoplasia radiologically. It is definitely not a case of symmetrical hypoplasia because the other side of the dental arch is normal.

The dates of the injury and of the extraction of both deciduous teeth were found in

the appropriate record card index of the Dental Hospital.

DENTAL RADIOGRAPHY AND DARKROOM PROCEDURE

COMMON FAULTS AND HOW TO AVOID THEM

*From Ilford Limited Department of Radiography and Medical Photography, Tavistock House North, Tavistock Square, W.C.*1.

4. CORRECTION OF DENSITY AFTER OVEREXPOSURE

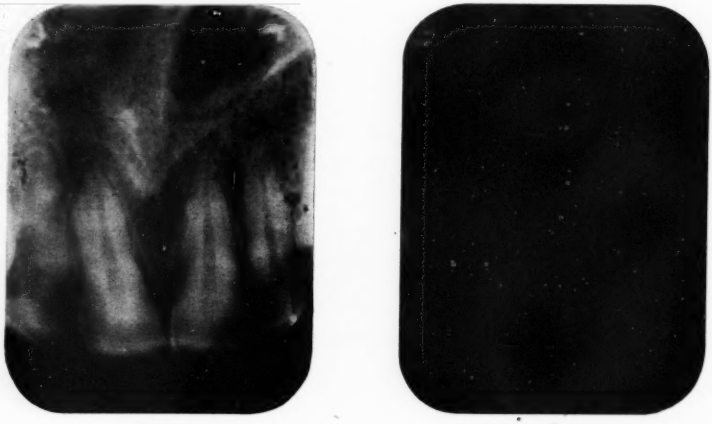
When overexposure has occurred it may not be necessary to repeat the exposure, as the density of the radiograph can be corrected in a solution referred to as Farmer's Reducer. At the same time the contrast of the film will be increased as the weaker densities are reduced at a greater speed than the heavier densities.

The chemical used is potassium ferricyanide mixed, at the time of use, with a fresh 20 per cent solution of plain hypo.

The potassium ferricyanide can be obtained in tablet form, but if crystals are preferred the formula is as follows:—

Potassium ferricyanide	50 gr.	or	2·5 gr.
Water, up to	1 oz.		25 c.c.

The hypo should be placed in a beaker and the potassium ferricyanide added drop by drop until the solution in the beaker reaches a pale straw colour. They should not be mixed until required. After full fixation and a brief wash the film should be removed from the hanger by using a single dental clip to avoid touching it by hand; it should then be immersed and agitated in Farmer's Reducer until the required density is reached. Frequent inspection is essential to prevent the reducing process being carried too far. When the desired density is reached the film should be washed in the usual way in running water for half an hour and hung to dry in a place which is free from dust particles.



A B

Fig. 1.—A, Overexposed film treated with Farmer's Reducer; B, A similar film untreated.

It will be noticed that the film surface has a shiny appearance after this treatment, but this does not in any way detract from its value for diagnosis.

Should the reducing process be overdone the image of the tooth may be entirely removed by the "cutting" action of the chemicals,

leaving only the celluloid base of the film. Too high a concentration of the potassium ferricyanide or the use of stale hypo solution may cause undesirable staining of the radiograph.

For the illustration (*Fig.* 1) a No. 5 Ilford dental film pack was overexposed to X rays. Both films of the pack were processed in the usual manner and, when washed, film A was treated with Farmer's Reducer, and film B was left as it was for comparison. It will be seen that A has been reduced to quite good diagnostic quality.

NEW MATERIALS AND APPLIANCES

CROFORM DUPLICATING MATERIAL

THIS material has been given a very thorough test under normal working conditions in the laboratory. Both skilled and apprentice technicians have used this material and in all cases with complete success.

In order to give the material an exacting test it was used for duplicating "bridge"

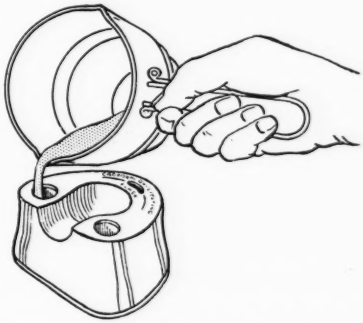
models and the completed bridges were tried for fit on the master and duplicated models; in every case extreme accuracy of the duplicate was proved.

We give the manufacturers' instructions, etc., below. When the process has been carried out once it will be found extremely simple. The material can be used over and over again, and at 30s. per tin of 2½ lb. is quite reasonably priced.

There are two sizes of flasks, a large one at 18s. and a medium-sized one at 15s. These are well made from an aluminium alloy and should last a lifetime with normal usage.

INSTRUCTIONS

Melting and Pouring.—Croform duplicating material may be melted in a water bath (double cooker) or in a thermostatically controlled electric melter. When using a water bath, the water must be brought to the boil before placing the duplicating material in the metal inner container.



It becomes completely liquid in 12 minutes at 90° C. (195° F.)

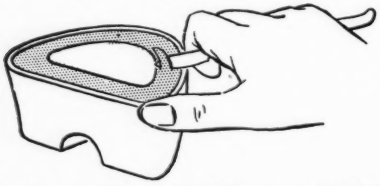
To ensure complete melting and even temperature distribution, stir with a glass rod.

Remove the inner container and allow the material to cool to 55° C. (130° F.)

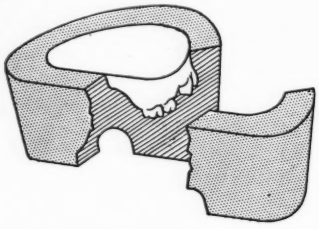
Check these temperatures with a thermometer.

Soak the master model in warm water (approximately 65° C. (150° F.)) until saturated. Blow off surplus water and fix to the bottom of the Croform duplicating flask with plasticine. Close and seal the flask. Fill the flask fairly rapidly, pouring away from the model, thus avoiding the possibility of trapping air on the palatal surface.

Allow it to cool for one hour, thus permitting Croform duplicating material to reach its maximum gel strength and elasticity.



Casting and Removal of Duplicate Model.—Remove the bottom plate of the flask and relieve the sides of the model carefully with a knife.



Ease master model gently out of the duplicating material. The mould is then ready for the duplicate model to be cast.

Vibrate the refractory, plaster, investment or other material gently into the mould.

When the duplicate model has set, push the entire contents out of the duplicating flask and peel the duplicating material from the model.

Free the duplicating material of all plaster or other foreign matter before returning it to its container prior to remelting. Keep the container tightly closed to avoid water loss.

(Marketed by Davis, Schottlander & Davis, Ltd., 24–30, Great Titchfield Street, London, W.1.)

LETTERS TO THE EDITOR

On Sitting Down

Dear Sir,

Strange that after two and a half to three years of the most hectic dentistry the profession will be called upon to bear or face again fully 90 per cent of all operators still go on developing varicose veins, drooping shoulders, and wry necks for lack of the knowledge on how to operate sitting down.

How unfortunately true it is that habit dies hard. It seems to me that all dental schools should provide stools and teach all students to sit down at the very earliest operative sessions.

True, this would force a revolution in type and arrangements of equipment, but what incalculable benefits would accrue.

There is really no difficulty in the technique—in fact I find it next to impossible to do any operations from fillings, scalings, and gingivectomies standing up. Having learnt the art, how much easier it is, how much more control one has, and how much more energy at the end of a day—however little that may be! Now just in case one should imagine that I have a nice quiet practice let me say at once that I run three surgeries single-handed apart from multiple nurses, and rarely see less than 40 patients per day. Whether this is a good thing or not is open to doubt, but it would be impossible without sitting down.

It must be stated that the standard dental unit is frankly useless for a sitting down

technique, as everything has been developed to operate from the front or side with the chair upright.

To sit down one operates directly behind a chair tilted so far back that the headrest is in one's lap! To meet immediate objections—no

patient ever complains and most find it a forced psychological rest position. Hence from this position the bracket table requires to be behind the chair and on either the operator's left or right. I prefer the left side, with the dental cabinet within easy reach on my right as I sit behind the chair.

Henceforth with a good nurse one can perform the most complicated and prolonged operation without moving. It is all a matter of arrangement of equipment and control of staff.

The only unit I have found of any use to me is a D. M. Co. mobile model which is kept on the left side of the chair with the bracket table behind. This has a full banjo-table which is unfortunately useless in this position. This unit with the table mounted on a far shorter arm would appear to be ideal for the sitting down technique as it can be moved anywhere, and is independent of the spittoon.

However, all operators should attempt to sit down for all tedious operations and a little ingenuity in the re-arrangement of the surgery would provide an immense aid to energy conservation.

There are a few photographs available of arrangements in two of the surgeries—the general layout and position can be clearly seen.

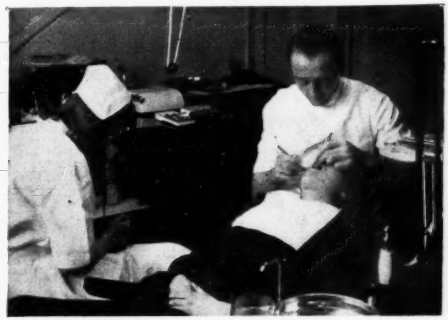
Yours faithfully,

L. A. PHILPOTT.

To the Editor,

Dear Sir,

Since my note on "Sitting down" I have had the opportunity of trying out the Murray stool and must confess that it is a revolutionary piece of equipment.



For the confirmed "stander" it will fall completely into his plan with a minimum of upheaval. For those already sitting down it is the stool of perfection.

Readers who are interested can see one in my surgery on any Monday they choose to call.

Yours truly,

Edgbaston. L. A. PHILPOTT.

INSTITUTE OF BRITISH SURGICAL TECHNICIANS (INC.)

A LECTURE will be given by Mr. J. Boswell, F.I.B.S.T., on "Chrome Cobalt Alloys" under the auspices of the Institute of British Surgical Technicians (Dental Section) on Tuesday, Oct. 23, 1951, at 6.30 p.m. at the Eastman Dental Clinic, Gray's Inn Road, W.C.1.

A Dental Brains Trust will be held at the Eastman Dental Clinic, Gray's Inn Road, W.C.1, on Tuesday, Nov. 20, at 6.30 p.m. Questions will be welcomed and should be sent to the Assistant Secretary, Institute of British Surgical Technicians, 6, Holborn Viaduct, E.C.1.

Admission tickets are obtainable on sending stamped addressed envelope to the Institute of British Surgical Technicians, 6, Holborn Viaduct, E.C.1, or through members of the Institute. Further lectures are being arranged.

ABSTRACTS
from Other Journals

Experimental Periodontal Reattachment in Rhesus Monkeys

A series of experiments performed on four healthy Rhesus monkeys for the purpose of investigating the possibility of reattachment of inflamed epithelialized periodontal pockets and the nature of the reattachment, if any, is described. In all cases the gingivæ were inflamed, but did not show pocket formation. Measurements were made from the incisal angles of the teeth to the depth of the crevices proximally. Pockets from 4 mm. to 7 mm. in depth were produced surgically and, in order to maintain these and also simulate faulty restorations, copper bands were fitted to the teeth concerned. After an initial severe gingival inflammation the condition gradually changed to resemble very closely that of a chronic periodontitis caused by a gold crown with overhanging margins, and in addition, pocket formation, which was not surgically created, occurred on the adjacent teeth.

After periods of between 26 and 31 days the bands were removed, measurements recorded, the teeth lightly scaled, and the pockets washed with a mild iodine solution. In spite of this treatment being twice repeated there was, at the end of ten days, no change in the pocket depths and the margins were inflamed, while some pus persisted.

Thorough scaling and filing of the root surfaces was performed to make them as smooth as possible, followed by the packing of cotton strings that had been saturated in a mixture of 75 per cent phenol and 25 per cent camphor into the pockets for five minutes, flushing with warm water, and drying with cotton rolls and hot air. An attempt was made to scrape away all epithelial lining cauterized by this method, and the area kept dry for about ten minutes to allow blood to clot within the pockets. The phenol camphor pack was applied again one month after initial application, and the teeth were scaled and polished twice a week until the animals were sacrificed.

A mild gingivitis was present in all cases at death, which was 90 to 117 days after the removal of the bands. Reattachment of between 2 mm. and 4 mm. was found in all except four of the eighteen teeth under experiment. Convincing photomicrographs are reproduced, showing that the reattachment was by both connective tissue and epithelium, there being definite cementum apposition in the connective tissue reattachment. The author considered that the degree of inflammation in the area of healing determined the nature of the reattachment, a lesser degree being associated with the connective tissue type.—RAMFJORD, S. (1951), *J. Periodont.*, **22**, 67.

The Late Results of Extraction of Six-year Molars

It has been claimed that the extraction of the six-year-old molar represents a means of reducing the D.M.F. rate, and that it is an orthodontic measure correcting cases of overcrowding, and also prevents impaction of the lower third molars.

A survey is reported on 130 military recruits, all 20 years of age. All the patients had had treatment previously in school clinics and were chosen out of 500 men. The general dental health of the recruits was found to be high; 0·18 per cent were caries free, 60·4 per cent with good mouth hygiene and restorations, caries with bad hygiene 20 per cent, and only 3·9 per cent with dentures. (Swiss Army.) Forty men with extracted first molars were examined and compared with 40 men without this extraction. The examination was by mirror and probe, radiographs, study models and photostat pictures of front and profile.

The results of this careful examination showed that the extraction of the first permanent molar does not reduce caries susceptibility, nor is crowding prevented. The group with the extracted molars showed a higher percentage of occlusal cavities, and about the same number of M.O., D.O., and M.O.D. cavities. The general conclusion was that the extraction of the first molar does not decrease the caries incidence, and that the consequent

disturbance of the occlusion must be carefully weighed. Third molar impaction was noted even after this extraction. There does not appear to be any disturbance in growth due to early extraction, but radiographs revealed deep recesses of the maxillary sinus in cases where the maxillary first molar had been extracted. The study models showed wandering of the teeth after these early extractions.

Extraction of the first molars is not advocated as an orthodontic measure, they should only be extracted if it is essential due to carious destruction. If the case requires extraction for orthodontic purposes then the tooth of choice is the first bicuspid.—PFYFFER, A. (1951) *Schweiz. Mschr. Zahnheilk.*, **61**, 565.

Treatment of Dental and Dentigerous Cysts

The following nine varieties of cysts are described:—

1. *Dental cysts* or *radicular* or *periodontal cysts* derive their epithelium from remnants of the sheath of Hertwig, growing in granulomata around the roots of pulp-infected teeth which project into the cyst. If the tooth has been extracted this is termed a "residual cyst".

2. *Dentigerous* or *follicular cysts* are derived from the pericoronal epithelial membrane around the crown of a retained tooth which normally unites with the mucous membrane of the mouth during the eruption of the tooth to avoid an open wound. Therefore the crown projects into the tooth. Multiple dentigerous cysts may be observed in one person or in one family. The following types of cysts are rare:—

3. *Nasopalatine cysts* are derived from epithelial remnants in the incisive canal.

4. *Paradental cysts* distal to mandibular third molar arise in connexion with the marginal periodontal membrane of the tooth, possibly from the dental lamina.

5. *Fissural cysts* have been observed between the upper second incisor and canine, and originate from epithelial remnants between the floor of the nose and the palate, the persistence of which is the cause of the congenital clefts.

6. *Nasolabial cysts* occur under the lateral aspect of the nostril on the outside of the bone near the piriform aperture and are lined with columnar epithelium.

7. *Multilocular cysts* have been observed in the ascending ramus of the mandible with a single layer of squamous epithelium.

8. *Traumatic cysts*—seen in the lower jaw with no epithelium lining.

9. The *adamantinoma*, usually multilocular, arises by central degeneration of the epithelial cords of the tumour. Can be unilocular and of varying size.

It is possible that these cysts may turn malignant, although it is very rare.

TREATMENT: Five ways of treatment:—

1. Enucleation or total extirpation: (*a*) with primary suture of the oral mucosa; (*b*) with open drainage or packing of the cyst cavity.

2. Marsupialization or the Partsch operation, i.e., wide opening of cyst to the mouth.

3. Combination of methods (1) and (2).

4. Opening of the cyst to the nose, as in a Caldwell-Luc operation.

5. Destruction of the cyst epithelium by chemical means.

The method of choice in any particular case can be determined only after a very thorough examination of the patient. Advantages and disadvantages are enumerated in each type of treatment.—TRAUNER, R. (1951), *Internat. dent. J.*, 4, June, 97.

BOOK REVIEWS

ORAL PHYSIOLOGY. By JOHN T. O'ROURKE, B.S., D.D.S., Sc.D. Edited by LEROY M. S. MINER, M.D., D.M.D., Sc.D., Dr.P.H., Boston. $5\frac{1}{2} \times 8\frac{1}{2}$ in. Pp. 333. 1951. London: Henry Kimpton. 35s.

IT is a pity that the author of this work died before it was completed, for the material which he had prepared has been assembled by the editor into an extremely useful volume.

The stimulus and incentive to write the book arose from a remark by a professor of medicine to the effect that teeth are trivial and dental problems not worthy of attention. The author and editor did not believe this statement to be

true, and this book, which contains a wealth of references to world literature, is a conclusive proof that teeth, although not essential to survival, are necessary for health and vitality.

An alternative title for this book might have been "A Treatise on Mastication", for this subject is examined from every angle, both in health and in disease. Owing to the very comprehensive manner in which the subject of each chapter is treated, this work is not suitable for the undergraduate student who is studying Dental Physiology according to the syllabuses of the Examining Bodies of this country. The treatment is such as the post-graduate student, reading for higher qualifications, might be expected to employ, and a pious hope might be expressed that the examiners will eventually expect a similar standard in examinations for the Fellowships in Dental Surgery.

No physician or surgeon, be he in hospital or general practice, should fail to read this book, whilst careful study of it will make every qualified dentist realize that treating individual teeth, yet failing to analyse and treat the mouth as one entity and an organ of the body, is futile.

A. B. W.

DIAGNOSIS AND TREATMENT OF TUMOURS OF THE HEAD AND NECK. By GRANT E. WARD, M.D., D.Sc., F.A.C.S., and JAMES W. HENDRICK, M.D., M.S., Maryland. $6\frac{7}{8} \times 10$ in. Pp. 832 + xvi, with 9 coloured plates and 637 illustrations. 1950. Baltimore: The Williams & Wilkins Co. (London: Baillière, Tindall & Cox.) 114s.

THIS is a good book written by two American general surgeons with wide experience in tumours. Nevertheless, since the head and neck is an anatomical unit comprising many functional units, this work only augments standard text-books on oral, dental, ear-nose-and-throat, ophthalmic, thyroid, and plastic surgery and radiotherapy.

The stress is on the value of early and accurate diagnosis made possible only by a biopsy, and on the fact that anybody who undertakes treatment must be aware of the clinical value of both surgery and irradiation. Surgical pathology is discussed as a pointer to treatment, and attention is paid to precancerous lesions. Sections on anatomy are introduced when they have a special bearing on the subject. A chapter on embryology illustrating the histogenesis of many tumours has been included. The work is arranged on a regional basis, and is adapted equally well for consecutive reading or for reference.

It is difficult in the space of a review to pick out particular sections for comment, but the chapters on malignant tumours of the skin, lips, tongue, and oral cavity are scholarly, while the important chapter on rehabilitation written by four contributors is far too condensed, and could with advantage be given four times the space in future editions. Unfortunately, the chapters on benign tumours of the oral cavity and tumours of the jaws do not reach a very high standard. Even the term "epulis" is not understood as illustrated by the following sentence: "Chronic fibrosed granulomas can be differentiated from epulis usually clinically by the appearance of the gum and teeth."

The authors have their own clinical classification of leucoplakia and make the strange statement that "histologically hyperkeratosis and leucoplakia are indistinguishable". Except when Thoma is quoted, the section on cysts is poor, and neither the treatment of an ameloblastoma in the maxilla, nor the special problems of tumours involving the temporomandibular joint are considered. Fibrous dysplasia, Paget's disease, and eosinophilic granuloma are rather summarily dealt with in the chapter on tumours of the skull. Splints attached to natural or artificial teeth are not mentioned under the management of facial nerve injuries.

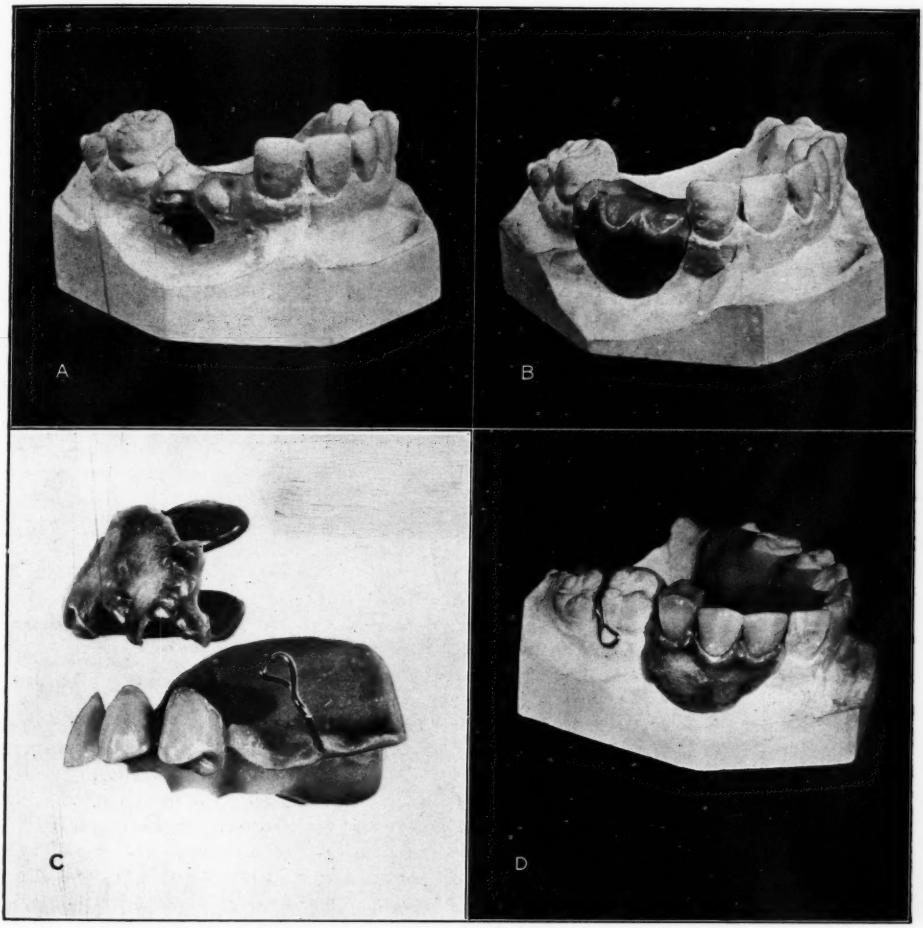
The production is excellent, and the abundant illustrations are well chosen and well placed in relation to the text. Dental surgeons in hospital practice and those taking higher qualifications will find this book well worth careful study, although the sections on their own special branch of surgery leave much to be desired.

B. E. D. C.

Issued with "The Dental Practitioner", October, 1951, Vol. II, No. 2

PARTIAL DENTURE CONSTRUCTION PROBLEMS

CHART No. 7. A TWO-PART PROSTHESIS



The patient had a cyst removed from the $\underline{|234}$ region. This left a cavity and considerable absorption of tissue in this area. The problem was to construct an appliance combining a denture and an obturator which would fill the cavity and restore contour. The difficulty would, of course, be to insert the appliance in the mouth. This was overcome by constructing a two-part prosthesis. The obturator filling the cavity and restoring the tissue loss was constructed with an extension to cover the ridge. Whilst in the wax stage, teeth were selected and fitted. They were then removed, leaving sockets in the wax. After processing, the obturator was fitted to the model and the area to be in contact with the denture covered with thin tin foil. The denture was now set up, and following a try in the mouth, processed over the obturator. Tin-foiling of the contact area prevented adhesion of the two parts. Upon removal from the flask, the denture was separated from the obturator and finished. The result was a two-part appliance, the obturator being fitted first and the denture secondly.

A, The model and cavity; B, The obturator fitted to the model; C, The obturator and denture; D, The finished appliance on the model.

C. T. YOULES.

OFFICIAL SUPPLEMENT OF THE

SURGICAL INSTRUMENT MANUFACTURERS' ASSOCIATION (INC.)

DENTAL LABORATORIES SECTION

Chairman: E. G. EMMETT, F.I.B.S.T.
Administrative Offices: 6, HOLBORN VIADUCT, LONDON, E.C.1
Telephone: CITY 6031

No. 7 October, 1951

Editorial Committee: MR. C. M. BOOTH; MR. H. J. POTTER, F.I.B.S.T.

EDITORIAL

WHILST the aim of this Supplement is primarily to provide information and guidance for the Professional Laboratory, it is evident from the comments received from practitioners and technicians that the various features cause considerable interest, and we are encouraged.

In the next issue, it is intended to commence an "un-funny" column and the items will appear under the heading "*Can you believe it?*". This will bring to the notice of those who participate in the fabrication of dental appliances some of the astounding methods which creep into the processes thereof and which militate against the making of a satisfactory case. We feel certain that this feature will be appreciated.

When this publication reaches you, your Main Committee will have again met, and YOUR representative will have expressed YOUR views regarding the items discussed on a lengthy agenda! Should this not be the case, then you can blame nobody but yourselves, through not having attended your branch meeting. Your representative's duty is not only to present your opinion regarding our various problems at these committees, but to report back at the following branch meeting the decisions arrived at by our collective representation. Again, if your "Branch News" does not appear in the space allocated for that purpose, it is either because your meetings have not been arranged to "match up" with that of the main committee, that you have not yet delegated a member especially to see that this is done, or that someone has neglected to deal with the report form sent to him by the editors. See to it that your Branch News is recorded in the next publication; it is in your hands!

The classes for dental technicians studying for the City and Guilds of London Institute syllabus will by now be in full swing, and no doubt as in previous years—due to the shortage of accommodation, instructors, and teachers of the ancillary subjects—many prospective students will have been disappointed! Can this lamentable situation serve to remind members, practitioners, and senior technicians, that they can do much by forming themselves into "Local Committees" and organize classes in their own regions? May we suggest that those who have this in mind should seek guidance from the N.J.C. Educational Advisory Committee, whose experience in the many problems that can arise is invaluable. Members of this Committee have already materially assisted the successful establishment of courses in most other regions.

> "Let those who may complain that it was all on paper remember that only on paper has humanity yet achieved glory, beauty, truth, knowledge, virtue and abiding love."—
>
> GEORGE BERNARD SHAW.

PERSONALITIES

Mr. RAYMOND MATHER, F.I.B.S.T.

Our picture this month is of Mr. Raymond Mather, well-known head of the Minerva Dental Laboratories of Cardiff.

Mr. Mather was originally desirous of becoming a marine engineer and was educated with this aim in view. Parental influence,

Mr. Raymond Mather.

however, persuaded him to change his mind and he took up a career in dentistry.

After serving in the Royal Flying Corps in the 1918 War, the Minerva laboratories were established in 1919 and since that time a large section of the profession has been served. The name "Minerva" has become well known and respected at home and abroad. During World War II Minerva had the task of supplying a large number of dentures for Generals and G.I.'s of the American Expeditionary Forces and Mr. Mather recalls this work with much pleasure and satisfaction.

The Minerva door is always open to interested visitors, and to these is explained the scheme on which the organization has been built. All departments can be inspected and the "layout" of these splendid modern workrooms is fully explained. The Stainless Steel department claims special attention, and it is worthy of note that a complete section is devoted to Engineering and Tool Making, where much of the equipment used by the firm and supplied to the profession is designed and produced.

In addition departments have been established for Development and for Tooth Manufacturing. The complete set-up enables the laboratories to be almost entirely self-supporting and provides the profession with a first-class service. A grand staff of about 150 craftsmen is an essential component and the undertaking covers about 18,000 sq. ft.

Mr. Mather always believed higher education for the dental technician to be necessary, and in 1919 he started his own internal night school classes, an enterprise which continued for twenty years.

A Founder Member of the Dental Laboratories Association (later incorporated as a section of the S.I.M.A.), he is a Fellow of the Institute of British Surgical Technicians, a body devoted to the higher education of dental and surgical technicians; as a member of the Moderating Committee of the City and Guilds of London Institute, he acts for that body as a local examiner in Dental Technology and also sits on several Local Education Committees.

We of S.I.M.A. are justly proud of two of his many distinctions. He it was who developed and introduced Stainless Steel to the Profession in this country in 1926, and in 1939 he was closely associated with the development of the "dough" technique for acrylic dentures, and he is much sought after as a lecturer on dental techniques.

With all the responsibilities which are his as head of this enterprising business it is characteristic of the man that he is at all times ready to give assistance or advice to anyone who seeks it, and such advice may range from book-keeping to a modern technique. Many laboratory owners who are successful to-day remember such a gesture with gratitude.

As may be supposed, he is also active in the work of our Association, acting as Hon. Secretary and sharing the guidance of the South Wales and Monmouthshire Branch.

COSTING

By **R. MATHER**

Verbatim Report of Lecture given by Mr. R. Mather at the One-day Conference on July 7, 1951

TODAY, my subject is *COSTING*. Now, what is Costing? What does it mean? Costing, in our case, means the correct evaluation of the expenditure involved in the conduct of a Laboratory which is organized to give a group of dentists the service which they need satisfactorily to carry on their practices. Costing means the replacement of guesswork by the application of figures which can be truly justified. Laboratory owners have a duty to perform, both to their customers and themselves, and must have accurate figures upon which to base the cost of the work which they carry out on behalf of the dentist.

All I have to say this afternoon will be based on average technicians, doing average work in average laboratories for average dentists. It would take too long to cover all the branches of prosthetics, and so I propose to deal with the largest group of denture production in which the largest number of laboratories are now engaged.

As the circumstances which now exist are likely to continue and probably become more depressed, it would appear that this is the most opportune time for us to discuss the costing problem. The high pressure of work is now easing off, and we are faced with the task of getting our laboratories organized into a more normal stride and running our business at a slower tempo.

I have started off by emphasizing the word "average", and most of us here to-day have now realized that "averages" are things which catch up on us all, sooner or later. We now know that the dental profession, like any other business, is subject to "ups" and "downs", and the peculiarity is that the "ups" go up too high and are followed by "downs" which come down too low. So it is up to us to try and keep a balance.

I shall assume that the capital position of all laboratories is satisfactory, and that reasonable provision for development has been made. Now, having accepted this fact, where do we start our basis for costing?

Before the war, the general practice was to sell dentures to dentists at a comprehensive price. During the war this fashion changed, and it became prevalent for labour charges to be quoted for the making of dentures, plus the price of teeth which were used thereon.

What I wish to do to-day is to put the problem of costing before you on the most simple basis possible which will be within the scope of all, and will entail the minimum amount of work.

Based on the theory that there is nothing new under the sun, what I wish to tell you about costing will obviously not be new. In fact, I am quite sure that you will all feel that you are well aware of what I shall say, but the mystery, of course, is this—why so few laboratories get down to even a simple method of costing.

What are we doing? Now, we are no longer selling dentures, but are selling man hours, whether these be our own personal man hours or those of our technicians. At this point, I would like to make it quite clear that the figures I shall quote will be based both on the employer and employee normally working a 44-hour week.

The man hours we have for sale can only be calculated on the productive man hour basis, that is, people actively engaged in some part of the actual production of dentures. No office staff nor any part of the employers' time spent on office work, even the help which one may receive from one's wife or family (if not in the laboratory production) must not be included.

The sale of productive man hours is the sole source of income, and this fact must be carefully borne in mind under all circumstances.

In calculating the man hours for sale, it would appear that this figure is arrived at by

multiplying 44 by 52, and giving the total man hours for sale per man per annum as 2288. However, this is obviously not correct, because the employee as well as the employer takes a fortnight's holiday per annum, also six statutory bank holidays per annum, and has the misfortune of losing on an average 70 hours per annum as a result of sickness or other causes.

From this, you will see that the total effective man hours one has for sale per technical employee is 2086, and this figure must be the basis of your man hour cost.

Now, let us see where this gets us when we try to establish our actual man hour cost. First, we must multiply 2086 hours by the number of effective technicians and record the total annual salaries of these employees. Next, we must add any annual salaries (but not man hours) of ancillary non-productive workers such as administrative workers, messengers, cleaners, etc., for we must not lose sight of the fact that the Dental Technician is the prime mover, and his direct earning capacity is relative to his working hours and must carry the salaries of non-productive workers. Therefore, let us always use the *technicians' man hours as our yard-stick.*

Let us build up an imaginary laboratory with a total staff of seven, made up of employer, three technicians, two apprentices, one secretary. The annual man hours for sale will be $2086 \times 5 = 10{,}430$ effective man hours, plus the technical work (not commercial work) done by the employer, say 1000 hours, the rest of the employer's time being taken up with supervising, interviewing, and the normal business duties which he has to perform; therefore, the total effective man hours for sale will be 11,430 per annum.

Shall we break this down into units of one week, just to make the figures more simple? When we do this, we get 11,430 divided by 52, giving us 220 effective man hours per week. Now, how much does this total of 220 effective man hours cost?

Here, you must fill in your own figures because you know the wages you pay, but, to keep the picture clear, I will use some figures for your guidance.

Let us assume that this organization with a staff of seven pays wages on this basis:

	£	s.	d.
Head technician	10	0	0
Two apprentices	4	10	0
Two technicians at £8 each ..	16	0	0
One secretary	5	0	0
One cleaner		10	0

Plus, the most important thing, the employer's weekly drawings, shall we say £12 per week. This then gives us a total of £48 per week.

To arrive at the actual effective man hour cost, we must divide £48 by 220 hours, and this gives us a cost of 4s. 4d. per hour.

So far, so good. What has yet to be added to the man hour cost? *Overheads.* So, let us look into this problem of what is involved here.

As it is the fashion to list labour charges for dentures plus teeth, we should, in order to keep a clear picture, include in our overheads *all*, and I mean *all* our expenses, except the cost of teeth.

Briefly, the items under this heading are as follows:

Assuming our hypothetical laboratory is functionally normally, the overhead costs, excluding teeth, will run to about £1100 to £1200 per annum, which means about £22 per week, and is mainly represented by the following figures:

	£	s.	d.
Rent, rates, water rates	3	0	0
Maintenance	2	0	0
Telephone, postages, etc.	1	10	0
Insurances, including National Health Insurance	3	0	0
Stationery and packing		10	0
Advertising, travelling, etc.	2	10	0
Gas, electricity, etc.	1	0	0
Plaster, pumice, lathe brushes, denture base material, etc.	5	0	0
Sundries	2	10	0
Petty cash	1	0	0

I have taken the liberty of filling in hypothetical figures in order to keep the picture straight, but here again, as with the wages, you must fill in your own figures.

The total amount of weekly overheads is, as you will see, £22, which has now to be divided by the 220 weekly effective man hours. This gives us a figure of 2s. per hour overheads, which figure has to be added to the wage cost of 4s. 4d. per man hour, giving a cost of 6s. 4d. per effective man hour.

This figure of 6s. 4d. per man hour virtually represents your man hour cost whether any work is done, or whether your staff is standing idle; this figure being only influenced by the fact that if no work is being done, obviously, no material is being used, but the rest of the overheads are virtually static.

At this point, although I have given a hypothetical weekly figure, I would urge all here, who, no doubt have been in business for at least one year or more, to take their annual overhead cost and then divide by 52.

I feel this is a most important point, because, here again, one finds a higher weekly average cost creeping up than one expects, and the only way to keep one's vision clear is to get this average cost over as long a period as possible, and then adjust the average monthly or quarterly as time goes on.

Just a word of warning. When you have arrived at these overhead costs, do not for one moment anticipate that they are going down. There is nothing surer to-day than the fact that they must go up, for we already know that the costs of telephones, postages, gas and electricity, and what have you, have gone up, and, of course, others may follow.

Having arrived at the fact that you have 220 man hours for sale per week, these man hours will cost you 220 × 6s. 4d., giving a total of £69 13s. 4d. This, of course, excludes the cost of teeth.

You have now to decide how best you can get a return on this weekly expenditure and what profit you aim to make. This brings me to the crucial point, and one upon which there is a never-ending argument. Just how long does it take to make a denture right through and how many dentures can a technician make in a week?

I do not want to get caught up in this weekly output argument, and for the purpose of discussion, I would like you to accept the figures which I give you. These figures represent the average production of about sixty laboratories which are large and small, and therefore, should be a very good guide.

You may be able to improve upon these figures, but on the other hand, you may not quite come up to them, but, as you think about this problem, do not forget that it is all based on a normal working week of 44 hours.

Now, what does it all boil down to? We have 11,430 effective man hours for sale per annum, and as it takes approximately 4½ hours to make a denture, we must divide the 11,430 by 4½, which gives us roughly 2540 dentures, which we must again divide by 52 to give us the weekly output. This figure then comes out at about 49. So, to make the figures easy, shall we say 50 dentures?

Now let us convert all this into earning capacity. Shall we assume that the production is fifty dentures per week, and that the average price of these dentures, taking full dentures and partial dentures (but, of course, minus teeth) is 30s. per denture. This means that your value of output per week will be £75 plus teeth.

In actual practice, the figures work out a bit different from this, and our hypothetical laboratory with a staff of seven would produce approximately 50 dentures, 2 flasks, pack and finish, and 12 repairs in an average week. This would mean that the income would be £75 for the dentures plus teeth, £2 5s. for the flask, pack and finish, and £6 for the repairs. This gives a total of £83 5s. plus teeth as the sales value of 220 effective man hours per week. Therefore, from this, you will see that the turnover of this laboratory, minus the charges for teeth, would be about £4300 per annum, and including the charges for teeth, suctions, gold wires, etc., would be about £5200 per annum.

What does this mean in relation to the man hours we are selling? It means this: the turnover of £83 5s. must be divided by the 220 effective man hours to find the earning capacity of these effective man hours. The answer to this is about 7s. 6d. Therefore, we now find that we are selling effective man hours at 7s. 6d. per man hour, and that these hours are costing us 6s. 4d. per hour, which, in simple language, means that we are making a gross profit of 1s. 2d. per effective man hour.

This gives a general picture, but you can fill in your own figures and arrive at your own conclusions. I would, however, like to issue a warning, and it is this. Time has proved that

dental technicians are very prone to overestimate their output ability, but time has also proved these wrong, and when one gets down to the average output of laboratories, it is found that the average of 10½ jobs, new cases, flask, pack and finish, repairs, etc., per week is an accurate figure for the work done.

From this, we get a very good general guide. The relationship of turnover to the other costs works out broadly to the following percentages:

	per cent	
Wages, drawings	47½	of the turnover
Overheads	22½	,,
Teeth and other chargeable goods	17½	,,
Gross profit is represented by ..	12½	,,

Now, this gross profit figure looks rather good, but it has to take care of some very important items. First and foremost, it is from this amount that your tax has to be paid. It also has to take care of such things as remakes which are done free of charge, disputed costs by customers, bad debts, and, of course, any part of the profits which are added back to the capital or used for additional plant or developments.

It is my hope that the discussion this afternoon will encourage everybody here to-day to get down to a method of costing; whether it is done on the simple basis I have put forward or a more involved basis, the main object is to inspire you all to cut out the guessing and get down to fundamental figures when arriving at charges you propose to make for work to be supplied to dentists.

NEWS FROM HEAD OFFICE

Abolition of Grade III and Wages Application.—The Unions' claims are still under consideration by the National Joint Council, and the B.D.A. hope to be in a position after the October meeting of their Representative Board to make certain proposals to the N.J.C. for the amendment of the existing conditions of service.

Reduction in Working Hours.—The Employers' Side of the N.J.C. have informed the trade unions that they cannot at present agree to any reduction in the working week. The Unions have therefore agreed not to press the matter further for the time being but reserve the right to re-open it at some future date.

Local Joint Training Committees.—The desirability of proceeding with the formation of these Committees has been stressed by S.I.M.A. in a letter to the National Joint Council, and the Council have agreed to do all within their power to press forward with the establishment of Joint Training Committees on the basis of the Constitution recently adopted. We hope that members of S.I.M.A. will participate in the work of these Committees and assist in their formation wherever possible.

Dental Technicians Bill.—We learn that the Government are not prepared at the present time to consider the registration of dental technicians, but it is suggested that the case for legislation should be pressed by all possible means when any Bill for the registration of auxiliary workers such as physiotherapists is presented to Parliament.

Vocational Training Scheme.—The Ministry of Labour has informed the National Joint Council that they have decided, in view of the representations made by the Council, that no further applicants will be accepted or admitted under the Vocational Training Scheme.

Interrupted Apprenticeship Scheme.—The National Joint Council has received a letter from the Ministry of Labour intimating that the Interrupted Apprenticeship Scheme has now been terminated.

Reinstatement of Apprentices.—We have had several inquiries as to the position in regard to apprentices who have returned to civil employment after service in the Forces and would advise members that apprentices whose training has been interrupted by the call-up should be reinstated so that they can complete their indentures at the point at which their training

was interrupted, and at the appropriate rate of pay for that year, i.e., an apprentice who has completed two years, and was then called up for military service, would on his return re-commence with the employer to whom he was previously apprenticed, in the third year at the rate of pay for that year, viz., 37s. 6d. per week.

Trade Discount.—Representations have been made to the dental manufacturing houses for a special trade discount to *bona fide* dental laboratories.

The Factory Act.—Members are reminded that dental laboratories are deemed to come within the scope of the Factory Act, and that within one month of occupying premises for the purpose of carrying on the work of a dental laboratory, the owner must give written notice to the District Factory Inspector stating: (*a*) Name of occupier or title of firm and postal address; (*b*) Nature of work; (*c*) Whether mechanical power is used and if so, its nature; (*d*) Name of District Council in whose district the premises are situated.

Export of Dentures.—For the information of members who may have inquiries from clients overseas, no export licence is required for the export of dentures not containing precious metal, except for Hong Kong and China, but licences are required if they contain precious metal. Licence applications should be made to the Board of Trade, Export Licensing Branch, Regis House, King William Street, E.C.4. Import regulations exist in some countries and applications for licences are usually the responsibility of the importer.

OBITUARY

It is with deep regret that we announce the death of Mr. Horace Naylor, which occurred suddenly on August 10.

He has been a member of the Dental Laboratories Section of S.I.M.A. since the inception of both the section and of the subsequently formed London Regional Branch.

Learning his craft with a Dental Surgeon and serving with H.M. Forces during the 1914–18 War, he has for the last seventeen years operated his own laboratory.

He leaves a wife and daughter, to whom we extend our sincere sympathy and condolence.

CORRESPONDENCE

Sirs,

With regard to the comment on holidays made in a previous editorial, perhaps some of the younger members may be interested in one method of approach to this somewhat difficult problem.

I have, in the past, tried staggered holidays and they proved to be most unsatisfactory; the staff were working one short for most of the summer, and this placed quite a burden on those who remained, and I think I may add that ultimately I did not get a holiday at all.

This obviously would not do, so I tried closing completely for the annual break, and here it seemed was the answer.

The weeks chosen are usually the first two in August, the extra day in lieu of the Bank Holiday is added to that at Christmas, which is preferred. It is a well-known fact that something over half the population like to include the first week of August in their holiday—this makes for a favourable start, as invariably work is much diminished at that period.

Past experience has shown that for those clients whose holiday does not coincide the main problem is that of repairs, and that arrangements can usually be made with another laboratory to handle these—as settlement can be entirely between laboratory and laboratory, monthly accounts remain undisturbed.

As the holiday date approaches, clients are again reminded, and at the same time asked, if they would care to increase the appointments of patients requiring prosthetic work, particularly during the last week, to

enable us to build up a sufficient quantity of work so that these patients can still receive attention while we are away.

This naturally means overtime, but the holidays just ahead supply the incentive in more ways than one.

If clients are co-operative, as mine fortunately are, very little time is actually lost and no great inconvenience caused.

Yours faithfully,

E. R. MACRO.

81*a*, *Cleaveland Road*, *Surbiton*.

NEWS FROM THE BRANCHES

North-western Branch Report.—The quarterly meeting of the Branch was held on Aug. 26 at the "Hydro", Windermere. All the arrangements for the day had been most carefully made by the local member, Mr. Whittaker, who also entertained the members at his laboratory, and all were agreed that the day had been successful and enjoyable.

Croydon Branch Report.—The Branch secretary is pleased to announce advance news of a lecture arranged for March, 1952. The services have been secured of Col. Schmidt, of the U.S.A.A.F., who will lecture on "Partial Dentures". Norbury Public Library has been booked for the occasion.

The London Regional Branch are proposing to hold an exhibition of Laboratory Equipment and Appliances in connexion with the Annual Conference Week-end, Feb. 8–9, 1952. It is hoped to have the co-operation of the Dental Houses in this venture.

South-western Counties.—The proposed South-western Counties Branch held a meeting at the Commercial Hotel, Newton Abbot, South Devon, on Saturday, Aug. 25, when Mr. C. A. Bricknell was in the chair. Mr. E. G. Emmett, who was invited to occupy the chair, addressed the meeting and there followed some lively discussion, after which a proposition was made, and it was agreed unanimously "that a formal application be made *en bloc* for membership to S.I.M.A. and that a Branch be formed".

A further meeting to elect officers was arranged. Mr. R. Mather then gave a brief talk on "Laboratory Costings".

Before the meeting closed, Mr. Bricknell proposed a vote of thanks to Mr. Emmett and Mr. Mather, not only for making long and tedious journeys to be present, but also for their acceptable contributions to the success of the meeting.

S.I.M.A. (DENTAL LABORATORIES SECTION) DIARY

West of Scotland Branch (*Secretary*: Mr. J. S. Fountain, F.I.B.S.T., 147, Bath Street, Glasgow, C.2.).—Meeting, Oct. 15, at the Bath Hotel, Bath Street, Glasgow.

North-western Branch (*Secretary*: Mr. W. Mayall, 15, King Street, Accrington).—Meeting, Nov. 18, at the Empire Hotel, Preston, 2 p.m. Subject: Surgical Plastics. Lecturers Messrs. R. C. Atherton and C. Staton.

Croydon Branch (*Secretary*: Mr. H. J. Nowers, F.I.B.S.T., 86, Croydon Road, Beddington, Croydon).—Business Meeting, Nov. 30, at the "Six Bells", Handcroft Road, Croydon.